(19)日本国特許庁（ＪＰ）　(12) **公開特許公報**（Ａ）　(11)特許出願公開番号

特開平6－11703

(43)公開日　平成6年(1994)1月21日

(51)Int.Cl.[5]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
Ｇ０２Ｆ　1/1333	５００	9225－2K		

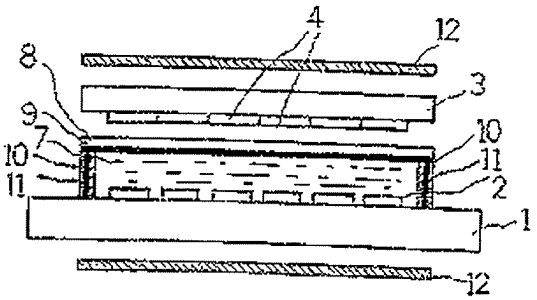
審査請求　有　　発明の数1(全 3 頁)

(21)出願番号　特願平5－84869
(62)分割の表示　特願昭58－239346の分割
(22)出願日　昭和58年(1983)12月19日

(71)出願人　000002369
セイコーエプソン株式会社
東京都新宿区西新宿２丁目４番１号
(72)発明者　小松　博志
長野県諏訪市大和３丁目３番５号株式会社
諏訪精工舎内
(74)代理人　弁理士　鈴木　喜三郎　(外１名)

(54)【発明の名称】　液晶表示装置

(57)【要約】
【目的】液晶パネルにおける基板の一方を薄ガラス基板にすることによって、製作工程の歩留まりを高め、広視野角の液晶パネルを製作する。
【構成】画素電極及び前記画素電極に接続されてなるスイッチング素子を有する第１の基板とカラーフィルター層を有する第２の基板によって形成されてなる液晶パネルにおいて、第２の基板の板厚が第１の基板の板厚より薄く、かつ画素電極の画素ピッチよりも小さく形成する。



1

【特許請求の範囲】

【請求項１】マトリックス状にスイッチング素子及び前記スイッチング素子に接続されてなる画素電極を有してなる第１の基板と、少なくとも前記画素電極に対応するカラーフィルター層を配置してなる第２の基板を有してなる液晶表示装置において．

該第１の基板と第２の基板は熱膨張係数が互いに異なり．該第２の基板の板厚は該第１の基板の板厚より薄く．かつ前記画素電極の幅よりも小さいことを特徴とする液晶表示装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は液晶表示装置に関するものであり、とりわけカラー液晶ディスプレイに用いる液晶表示装置に関するものである。

【０００２】

【従来の技術】アクティブマトリックス基板とカラーフィルタ基板で構成された従来のカラー液晶パネルの構造を図１に示す。ここでアクティブマトリックス基板とは能動スイッチング素子として例えば薄膜トランジスタ（ＴＦＴ）を用い、タイミング信号によってある画素を選択し、スイッチング素子のオン・オフで画素に一時的に電荷を蓄えることができるＴＦＴ基板のようなものを言う。図１において、１はアクティブマトリックス基板．２は前記アクティブマトリックス基板上に形成された画素電極、３はカラーフィルタ基板．４は前記カラーフィルタ基板上に形成された赤、緑及び青色を呈したカラー画素である。５は前記カラー画素上に形成した導電性透明薄膜である。６は前記アクティブマトリックス基板と前記カラーフィルタ基板を接着し．液晶を密封するためのシール材である。７はセル中に封入された液晶である。

【０００３】一般に液晶パネルを製作するに当たっては．液晶を一定方向に整然と並べるために液晶と直接接触するガラス基板表面をサラシや脱脂綿でこする．いわゆるラビングという処理が行われる。図１に示したパネル構造のものにおいては．ラビングは１のアクティブマトリックス基板表面と３のカラーフィルタ基板表面の両基板に行う必要がある。ところがカラーフィルタ基板表面の各カラー画素はゼラチンなどの柔らかい薄膜で形成され．更に各カラー画素毎に凹凸が存在するため．その表面をサラシ等でこすると傷がつき易く、パネルにした際その傷が目立ち画像品質が劣る問題があった。

【０００４】又．図１に示した構造の液晶パネルの場合．４のカラー画素中から液晶にとって不純物であるイオンが溶け出し．液晶の物性が変化してコントラストなどが変わってしまう問題があった。そこでこれらの問題点を克服するために図２に示した構造のカラー液晶パネルが考え出された。図２において、１から４、６及び７は図１において説明したものにそれぞれ対応する。８は

2

薄ガラス板、９は前記薄ガラス板上に形成された導電性透明薄膜である。

【０００５】この装置の特徴はカラーフィルタ基板を液晶セルの構成には直接用いず、その代わりに薄ガラス板を使用したところにある。この構造においては．薄ガラス板は薄く平坦であるため．前述したラビングを強く行うことができる。そのため画像品質の向上が期待できる液晶表示構造である。

【０００６】

【発明が解決しようとする課題】ところが、図２に示した薄ガラス板の厚さは、カラー液晶ディスプレイとして．それを見る人の視角を広げるために、画素電極の幅よりも小さくする必要がある。画素電極の大きさは、そのパネルの面積にもよるが．数百μｍ程度が一般的で、それに用いる薄ガラス板厚も数百μｍ程度でなければならない。

【０００７】一方、図１や図２に示した液晶パネルの構造の６で示したシール材の種類は、その性質として、ガラスとの接着力が強く、液晶の密封性のよい、熱硬化型接着剤が用いられている。熱硬化型接着剤は加熱温度として室温より高温の例えば１００℃前後を選ぶ必要がある。薄ガラス板を熱硬化型接着剤を用いてアクティブマトリックス基板に接着した場合、薄ガラス板とアクティブマトリックス基板の熱膨張係数の相違によって．薄ガラス板に残留応力が発生し．薄ガラス板が割れたり、液晶セルのギャップが、シール付近とパネル中央付近とで大きな差を生じてしまう問題点があった。

【０００８】本発明はこのような問題点を解決し．製作工程の歩留まりを高め、また製作後のパネルの信頼性が高い薄ガラス使用の液晶パネルを製作するところにその目的がある。

【０００９】

【課題を解決するための手段】本願発明の液晶表示装置は．マトリックス状にスイッチング素子及び前記スイッチング素子に接続されてなる画素電極を有してなる第１の基板と、少なくとも前記画素電極に対応するカラーフィルター層を配置してなる第２の基板を有してなる液晶表示装置において、該第１の基板と第２の基板は熱膨張係数が互いに異なり、該第２の基板の板厚は該第１の基板の板厚より薄く、かつ前記画素電極の幅よりも小さいことを特徴とする。

【００１０】

【実施例】以下．本発明について実施例に基づき詳細に説明する。

【００１１】図３に実施例の一例を示す。図中１～４、７～９は図２に示したものとそれぞれ対応する。１のアクティブマトリックス基板としては．スイッチング素子として薄膜トランジスタ（ＴＦＴ）を用い、２の画素電極はＩＴＯ（インジウムティンオキサイド）膜を用い、画素ピッチは横１６０μｍ．縦１３０μｍに形成した。

８の薄ガラス板の厚さは１００μｍとし、その表面に９で示された厚さ４００Ａ程度のＩＴＯ導電膜を形成した。１０は紫外線照射硬化型接着剤であり、１１はその中に混合された７μｍφのグラスファイバギャップ材である。また１２は偏光板である。

【００１２】組立方法としては、まず１のＴＦＴ基板上にギャップ材混合の紫外線照射硬化型接着剤をシール印刷する。紫外線照射硬化型接着剤として、積水ファインケミカル（株）社製のＡ３０２ＬＢを使用した。次にシール印刷後のＴＦＴ基板上にＩＴＯ付きの薄ガラス板を置き、その上に平板石英ガラスを当て、シール材を押しつぶしてギャップ材の大きさにて制御されるセル厚を保持したまま紫外線を照射させた。紫外線照射はＴＦＴ基板の法線方向からパネル前面わたって均一に行った。紫外線照射に伴う温度上昇を避けるため、台座に熱容量の大きな金属板を用い、液晶セル温度を室温付近に維持した。

【００１３】その結果、セル厚はシール部分付近で７μｍ、パネル中央付近で約８μｍとなり、従来の熱硬化型接着剤を用いた方式と比較して、パネル中央のセル厚が約３μｍ平坦化された。なお液晶封入後においてセル厚はパネル全面にわたって均一で７μｍ程度であった。組立歩留まりは、接着時に熱応力を加えない分だけ良くなり、熱硬化型接着剤を用いたパネル組立歩留まりより約１０％向上した。このように薄ガラス板を紫外線照射硬化型接着剤でＴＦＴ基板に接着し、液晶パネルを構成して図３に示す如く液晶パネルの上にカラーフィルタ基板及び偏光板をつけた。

【００１４】このカラー液晶パネルの表示特性は熱硬化型接着剤を用いた薄ガラス使用のものと代わらず、許容＊

＊視角もまた変わらない。

【００１５】

【発明の効果】以上のように、本発明によって表示特性は従来方式のものと変えずに、従来方式で問題となっていた薄ガラス板とアクティブマトリックス基板の間の熱膨張係数の相違による薄ガラス板への残留応力を軽減し、組立工程中の割れの発生、及びギャップ不良を最小におさえ、組立歩留まり、組立後の信頼性を高めることができた。また、紫外線照射効果型接着剤は約５分の紫外線照射によって硬化するため、従来の熱硬化型接着剤などを利用した組立工程よりその組立時間を短縮できた。

【図面の簡単な説明】

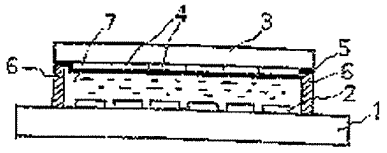
【図１】従来のカラー液晶パネル構造の概略図。

【図２】薄ガラス板を用いたカラー液晶パネル構造の概略図。

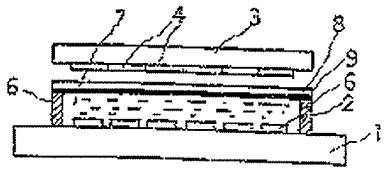
【図３】本発明の一実施例を示したカラー液晶パネルの構造の断面図。

１・・・アクティブマトリックス基板
２・・・画素電極
３・・・カラーフィルタ基板
４・・・カラー画素
５・・・導電性透明薄膜
６・・・シール剤
７・・・液晶
８・・・薄ガラス板
９・・・ＩＴＯ導電膜
１０・・・紫外線照射効果型接着剤
１１・・・グラスファイバギャップ材
１２・・・偏光板

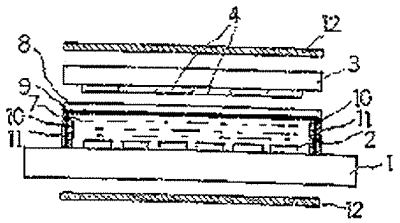
【図１】



【図２】



【図３】



* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The 1st substrate which comes to have the pixel electrode which it comes to connect with a switching element and said switching element in the shape of a matrix, In the liquid crystal display which comes to have the 2nd substrate which comes to arrange the color filter layer corresponding to said pixel electrode at least It is the liquid crystal display which this 1st substrate differs in a coefficient of thermal expansion from the 2nd substrate mutually, and is characterized by the board thickness of this 2nd substrate being thinner than the board thickness of this 1st substrate, and being smaller than the width of face of said pixel electrode.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the liquid crystal display especially used for a color liquid crystal display about a liquid crystal display.
[0002]
[Description of the Prior Art] The structure of the conventional electrochromatic display panel which consisted of an active-matrix substrate and a color filter substrate is shown in drawing 1 . Using a thin film transistor (TFT) as an active switching element, an active-matrix substrate chooses a certain pixel with a timing signal, and means a thing like a TFT substrate which can store a charge in a pixel temporarily by turning on and off of a switching element here. In drawing 1 , they are the red by whom the pixel electrode with which 1 was formed in the active-matrix substrate and 2 was formed on said active-matrix substrate, and 3 were formed in the color filter substrate, and 4 was formed on said color filter substrate, and the color pixel which presented green and blue. 5 is the conductive transparence thin film formed on said color pixel. 6 is a sealant for pasting up said active-matrix substrate and said color filter substrate, and sealing liquid crystal. 7 is the liquid crystal enclosed into the cel.
[0003] In generally manufacturing a liquid crystal panel, in order to put liquid crystal in order tidily in the fixed direction, processing which rubs the glass substrate front face which contacts liquid crystal and directly with SARASHI or absorbent cotton and which is called the so-called rubbing is performed. In the thing of the panel structure shown in drawing 1 , it is necessary to perform rubbing to both the substrates of the active-matrix substrate front face of 1, and the color filter substrate front face of 3. However, since it was formed with soft thin films, such as gelatin, and irregularity existed for every color pixel further, when the front face was rubbed by SARASHI etc., a blemish tends to have attached each color pixel of a color filter substrate front face and it was used as a panel, it had the problem which the blemish is conspicuous and is inferior in image quality.
[0004] Moreover, in the case of the liquid crystal panel of the structure shown in drawing 1 , the ion which is an impurity for liquid crystal began to melt out of the color pixel of 4, and there was a problem which the physical properties of liquid crystal change and changes contrast etc. Then, in order to conquer these troubles, the electrochromatic display panel of the structure shown in drawing 2 was invented. In drawing 2 , 1 to 4, 6, and 7 correspond to what was explained in drawing 1 , respectively. It is the conductive transparence thin film with which 8 was formed in the thin glass plate and 9 was formed on said thin glass plate.
[0005] The description of this equipment is in the place which used the thin glass plate for the configuration of a liquid crystal cell, not using [instead] a color filter substrate directly. In this structure, since a thin glass plate is hard and flat, rubbing mentioned above can be performed strongly. Therefore, it is the liquid crystal display structure where improvement in image quality is expectable.
[0006]
[Problem(s) to be Solved by the Invention] However, in order to extend the viewing angle of those who look at it as a color liquid crystal display, it is necessary to make smaller than the width of face of a pixel electrode thickness of the thin glass plate shown in drawing 2 . The magnitude of a pixel electrode is based on the area of the panel, and about hundreds of micrometers must be common and the thin glass plate thickness used for it must also be about hundreds of micrometers.
[0007] The class of sealant shown on the other hand by 6 of the structure of the liquid crystal panel shown in drawing 1 or drawing 2 has strong adhesive strength with glass as the property, and heat-curing mold adhesives with the sufficient sealing performance of liquid crystal are used. Heat-curing mold adhesives need to choose

for example, hot 100-degree-C order from a room temperature as whenever [stoving temperature]. When a thin glass plate was pasted up on an active-matrix substrate using heat-curing mold adhesives, residual stress occurred in the thin glass plate by difference of the coefficient of thermal expansion of a thin glass plate and an active-matrix substrate, the thin glass plate broke and there was a trouble that the gap of a liquid crystal cell produced a big difference near a seal and near a panel center.

[0008] This invention has the purpose in the place which solves such a trouble, and raises the yield of a manufacture process, and manufactures the liquid crystal panel of the thin glass use with the high dependability of the panel after manufacture.

[0009]

[Means for Solving the Problem] The 1st substrate which comes to have the pixel electrode which comes to connect the liquid crystal display of the invention in this application with a switching element and said switching element in the shape of a matrix, In the liquid crystal display which comes to have the 2nd substrate which comes to arrange the color filter layer corresponding to said pixel electrode at least This 1st substrate differs in a coefficient of thermal expansion from the 2nd substrate mutually, and board thickness of this 2nd substrate is characterized by being thinner than the board thickness of this 1st substrate, and being smaller than the width of face of said pixel electrode.

[0010]

[Example] Hereafter, this invention is explained to a detail based on an example.

[0011] An example of an example is shown in drawing 3 . 7-9 correspond among [1-4] drawing with what was shown in drawing 2 , respectively. As an active-matrix substrate of 1, the pixel electrode of 2 formed the pixel pitch in 160 micrometers wide and 130 micrometers long using the ITO (indium TIN oxide) film, using a thin film transistor (TFT) as a switching element. Thickness of the thin glass plate of 8 was set to 100 micrometers, and formed in the front face the ITO electric conduction film with a thickness of about 400A shown by 9. 10 is UV irradiation hardening mold adhesives, and 11 is the glass fiber gap material of 7 micrometerphi mixed in it. Moreover, 12 is a polarizing plate.

[0012] As the assembly approach, seal printing of the UV irradiation hardening mold adhesives of gap material mixing is first carried out on the TFT substrate of 1. As UV irradiation hardening mold adhesives, A302LB by the Sekisui Fine chemical company was used. Next, a thin glass plate with ITO is placed on the TFT substrate after seal printing, monotonous quartz glass is applied on it, and ultraviolet rays were made to irradiate with the cel thickness held which crushes a sealant and is controlled by magnitude of gap material. Face-of-panel cotton carried [of the TFT substrate] out UV irradiation to homogeneity from the normal. In order to avoid the temperature rise accompanying UV irradiation, the metal plate with big heat capacity was used for the plinth, and liquid crystal cell temperature was maintained near the room temperature.

[0013] Consequently, cel thickness was set to about 8 micrometers 7 micrometers and near the panel center near the seal part, and about 3-micrometer flattening of the cel thickness of the center of a panel was carried out as compared with the method using the conventional heat-curing mold adhesives. In addition, cel thickness was uniform over the whole panel surface after liquid crystal enclosure, and it was about 7 micrometers. Only the part which does not apply thermal stress at the time of adhesion became good, and the assembly yield improved about 10% from the panel-erection yield using heat-curing mold adhesives. Thus, the thin glass plate was pasted up on the TFT substrate with UV irradiation hardening mold adhesives, and as a liquid crystal panel was constituted and it was shown in drawing 3 , the color filter substrate and the polarizing plate were attached on the liquid crystal panel.

[0014] The display property of this electrochromatic display panel is not replaced with the thing of thin glass use which used heat-curing mold adhesives, and does not change a permissible viewing angle, either.

[0015]

[Effect of the Invention] As mentioned above, by this invention, the residual stress to the thin glass plate by difference of the coefficient of thermal expansion between the thin glass plate which had become a problem by the conventional method, and an active-matrix substrate was able to be mitigated without changing with the thing of the conventional method, the erector was able to press down generating of an inner crack, and a poor cap to min, and the display property was able to raise the dependability after the assembly yield and assembly. Moreover, since the UV irradiation effectiveness mold adhesives were hardened by the UV irradiation for about 5 minutes, the erector using the conventional heat-curing mold adhesives etc. has shortened the assembly time amount more more.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL FIELD

[Industrial Application] This invention relates to the liquid crystal display especially used for a color liquid crystal display about a liquid crystal display.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

PRIOR ART

[Description of the Prior Art] The structure of the conventional electrochromatic display panel which consisted of an active-matrix substrate and a color filter substrate is shown in drawing 1 . Using a thin film transistor (TFT) as an active switching element, an active-matrix substrate chooses a certain pixel with a timing signal, and means a thing like a TFT substrate which can store a charge in a pixel temporarily by turning on and off of a switching element here. In drawing 1 , they are the red by whom the pixel electrode with which 1 was formed in the active-matrix substrate and 2 was formed on said active-matrix substrate, and 3 were formed in the color filter substrate, and 4 was formed on said color filter substrate, and the color pixel which presented green and blue. 5 is the conductive transparence thin film formed on said color pixel. 6 is a sealant for pasting up said active-matrix substrate and said color filter substrate, and sealing liquid crystal. 7 is the liquid crystal enclosed into the cel.

[0003] In generally manufacturing a liquid crystal panel, in order to put liquid crystal in order tidily in the fixed direction, processing which rubs the glass substrate front face which contacts liquid crystal and directly with SARASHI or absorbent cotton and which is called the so-called rubbing is performed. In the thing of the panel structure shown in drawing 1 , it is necessary to perform rubbing to both the substrates of the active-matrix substrate front face of 1, and the color filter substrate front face of 3. However, since it was formed with soft thin films, such as gelatin, and irregularity existed for every color pixel further, when the front face was rubbed by SARASHI etc., a blemish tends to have attached each color pixel of a color filter substrate front face and it was used as a panel, it had the problem which the blemish is conspicuous and is inferior in image quality.

[0004] Moreover, in the case of the liquid crystal panel of the structure shown in drawing 1 , the ion which is an impurity for liquid crystal began to melt out of the color pixel of 4, and there was a problem which the physical properties of liquid crystal change and changes contrast etc. Then, in order to conquer these troubles, the electrochromatic display panel of the structure shown in drawing 2 was invented. In drawing 2 , 1 to 4, 6, and 7 correspond to what was explained in drawing 1 , respectively. It is the conductive transparence thin film with which 8 was formed in the thin glass plate and 9 was formed on said thin glass plate.

[0005] The description of this equipment is in the place which used the thin glass plate for the configuration of a liquid crystal cell, not using [instead] a color filter substrate directly. In this structure, since a thin glass plate is hard and flat, rubbing mentioned above can be performed strongly. Therefore, it is the liquid crystal display structure where improvement in image quality is expectable.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] As mentioned above, by this invention, the residual stress to the thin glass plate by difference of the coefficient of thermal expansion between the thin glass plate which had become a problem by the conventional method, and an active-matrix substrate was able to be mitigated without changing with the thing of the conventional method, the erector was able to press down generating of an inner crack, and a poor cap to min, and the display property was able to raise the dependability after the assembly yield and assembly. Moreover, since the UV irradiation effectiveness mold adhesives were hardened by the UV irradiation for about 5 minutes, the erector using the conventional heat-curing mold adhesives etc. has shortened the assembly time amount more more.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in order to extend the viewing angle of those who look at it as a color liquid crystal display, it is necessary to make smaller than the width of face of a pixel electrode thickness of the thin glass plate shown in drawing 2 . The magnitude of a pixel electrode is based on the area of the panel, and about hundreds of micrometers must be common and the thin glass plate thickness used for it must also be about hundreds of micrometers.
[0007] The class of sealant shown on the other hand by 6 of the structure of the liquid crystal panel shown in drawing 1 or drawing 2 has strong adhesive strength with glass as the property, and heat-curing mold adhesives with the sufficient sealing performance of liquid crystal are used. Heat-curing mold adhesives need to choose for example, hot 100-degree-C order from a room temperature as whenever [stoving temperature]. When a thin glass plate was pasted up on an active-matrix substrate using heat-curing mold adhesives, residual stress occurred in the thin glass plate by difference of the coefficient of thermal expansion of a thin glass plate and an active-matrix substrate, the thin glass plate broke and there was a trouble that the gap of a liquid crystal cell produced a big difference near a seal and near a panel center.
[0008] This invention has the purpose in the place which solves such a trouble, and raises the yield of a manufacture process, and manufactures the liquid crystal panel of the thin glass use with the high dependability of the panel after manufacture.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] The 1st substrate which comes to have the pixel electrode which comes to connect the liquid crystal display of the invention in this application with a switching element and said switching element in the shape of a matrix, In the liquid crystal display which comes to have the 2nd substrate which comes to arrange the color filter layer corresponding to said pixel electrode at least This 1st substrate differs in a coefficient of thermal expansion from the 2nd substrate mutually, and board thickness of this 2nd substrate is characterized by being thinner than the board thickness of this 1st substrate, and being smaller than the width of face of said pixel electrode.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EXAMPLE

[Example] Hereafter, this invention is explained to a detail based on an example.
[0011] An example of an example is shown in drawing 3 . 7-9 correspond among [1-4] drawing with what was shown in drawing 2 , respectively. As an active-matrix substrate of 1, the pixel electrode of 2 formed the pixel pitch in 160 micrometers wide and 130 micrometers long using the ITO (indium TIN oxide) film, using a thin film transistor (TFT) as a switching element. Thickness of the thin glass plate of 8 was set to 100 micrometers, and formed in the front face the ITO electric conduction film with a thickness of about 400A shown by 9. 10 is UV irradiation hardening mold adhesives, and 11 is the glass fiber gap material of 7 micrometerphi mixed in it. Moreover, 12 is a polarizing plate.
[0012] As the assembly approach, seal printing of the UV irradiation hardening mold adhesives of gap material mixing is first carried out on the TFT substrate of 1. As UV irradiation hardening mold adhesives, A302LB by the Sekisui Fine chemical company was used. Next, a thin glass plate with ITO is placed on the TFT substrate after seal printing, monotonous quartz glass is applied on it, and ultraviolet rays were made to irradiate with the cel thickness held which crushes a sealant and is controlled by magnitude of gap material. Face-of-panel cotton carried [of the TFT substrate] out UV irradiation to homogeneity from the normal. In order to avoid the temperature rise accompanying UV irradiation, the metal plate with big heat capacity was used for the plinth, and liquid crystal cell temperature was maintained near the room temperature.
[0013] Consequently, cel thickness was set to about 8 micrometers 7 micrometers and near the panel center near the seal part, and about 3-micrometer flattening of the cel thickness of the center of a panel was carried out as compared with the method using the conventional heat-curing mold adhesives. In addition, cel thickness was uniform over the whole panel surface after liquid crystal enclosure, and it was about 7 micrometers. Only the part which does not apply thermal stress at the time of adhesion became good, and the assembly yield improved about 10% from the panel-erection yield using heat-curing mold adhesives. Thus, the thin glass plate was pasted up on the TFT substrate with UV irradiation hardening mold adhesives, and as a liquid crystal panel was constituted and it was shown in drawing 3 , the color filter substrate and the polarizing plate were attached on the liquid crystal panel.
[0014] The display property of this electrochromatic display panel is not replaced with the thing of thin glass use which used heat-curing mold adhesives, and does not change a permissible viewing angle, either.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

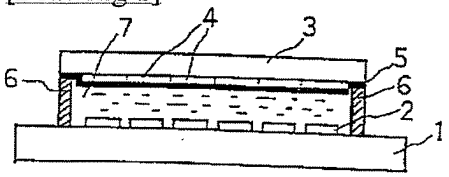
[Brief Description of the Drawings]
[Drawing 1] The schematic diagram of the conventional electrochromatic display panel structure.
[Drawing 2] The schematic diagram of electrochromatic display panel structure using a thin glass plate.
[Drawing 3] The sectional view of the structure of an electrochromatic display panel which showed one example of this invention.
1 ... Active-matrix substrate
2 ... Pixel electrode
3 ... Color filter substrate
4 ... Color pixel
5 ... Conductive transparence thin film
6 ... Sealing compound
7 ... Liquid crystal
8 ... Thin glass plate
9 ... ITO electric conduction film
10 ... The UV irradiation effectiveness mold adhesives
11 ... Glass fiber gap material
12 ... Polarizing plate

[Translation done.]

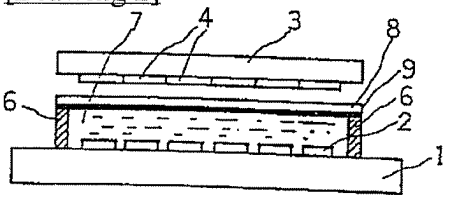
* NOTICES *

DRAWINGS

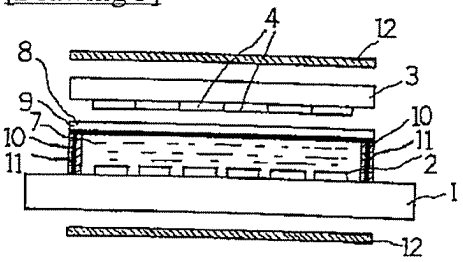
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]